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Protection Branch Report of Test No. 17-62

BACTERIAL PENETRATION OF ROBBINS BCO FILTER

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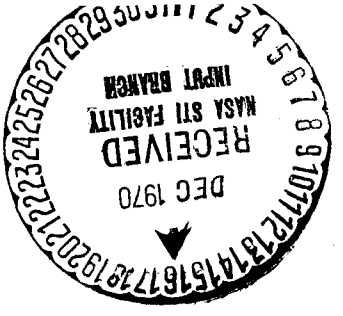

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Bacterial Penetration of Robbins* BCO Filter

Following the final sterilization of an interplanetary space vehicle the ethylene oxide-freon mixture, because of its heavy weight, must be removed from the craft prior to flight. The gaseous mixture will be replaced with nitrogen, a much lighter gas. In order to assure that the nitrogen used for this purpose is sterile, it must be passed through an efficient filter before entering the shroud covering the space craft. The Robbins BCO filter was selected as a potential filter for this system. At the request of Mr. George Hobby and Rolf Hastrup of Jet Propulsion Laboratory, two Robbins BCO cartridges were evaluated by Protection Branch to determine their efficacy in removing microbial particles from air. The results of these tests are the subject of this report.

Description

The BCO filter is contained in a $9\frac{1}{2}$ inch perforated cylinder $2\frac{1}{2}$ inches in diameter and is made of unbonded fiberglass PPG grade B-363 rolled around a perforated central discharge tube. The filter appears to be durable and well constructed.

* Robbins Aviation, Inc., 2350 East 38th Street, Los Angeles 58, California

Experimental

The filter was suspended inside a 1500 liter plexiglas aerosol chamber and the filter discharge connected to a tube leading to the outside of the test chamber. This tube was connected to a sampling plenum, a flow meter and a vacuum source.

When testing the filters, an aerosol of *B. globigii* spores was generated in the test chamber and maintained at an average concentration of 2.1×10^5 organisms per liter for the duration of the 30 minute tests. The particle size ranged from one to five microns in diameter. In the first series of tests for each filter, air was drawn through the filter at a rate of 3 cfm and in the second series it was drawn through at a rate of 0.3 cfm.

Samples of the challenging aerosol inside the chamber and samples of the filtered air in the sampling plenum were taken continuously during each 30 minute test. The sampling rate was 10 liters per minute for the 30 minutes or a total sample volume of 300 liters.

The samples were assayed by standard biological laboratory techniques.

Results and Conclusions

Table I shows the aerosol concentration before and after filtering and shows the per cent penetration for each of the two filters tested. The difference in penetration at the high and low flow rates is not considered significant.

The results of these tests indicate that this filter is as efficient as other commercial ultra-high efficiency filters for the removal of biological particles 1 micron or larger in diameter.

Table I.

Bacterial Penetration of Robbins Filter BCO

Filter No.	Test No.	Air Flow Rate cfm	Aerosol Conc. Org/Liter Before Filter	Aerosol Conc. Org/Liter After Filter	Penetration Per Cent
1	1	3	252,000	0.023	0.0000092
	2	3	313,300	0.013	0.0000042
	3	3	295,600	0.003	0.0000011
	4	3	277,600	0.01	0.0000036
	5	3	124,300	0.007	0.0000053
	6	3	153,300	0.003	0.0000021
	7	3	155,300	0.003	0.0000021
				Average	0.0000039
	8	0.3	190,000	0	< 0.0000017
	9	0.3	201,000	0	< 0.0000016
	10	0.3	194,330	0	< 0.0000016
				Average	< 0.00000163
2	1	3.0	230,000	0	< 0.0000014
	2	3.0	225,660	0	< 0.0000014
	3	3.0	221,000	0	< 0.0000015
	4	3.0	214,330	0.003	0.0000015
				Average	< 0.00000145
	5	0.3	204,330	0	< 0.0000016
	6	0.3	176,660	0	< 0.0000018
	7	0.3	161,000	0	< 0.0000020
				Average	< 0.0000018